

Amendments to the Drawings:

A replacement set of drawings, Figs. 1-13, is filed herewith.

"Annotated Sheets Showing Changes" and "Replacement Sheets" for Figs. 1-3, 6, 10, 12, and 13 are enclosed herewith.

In Fig. 1, the title of element 108 has been changed from "Front End" to "Front End Processor". Support for this change can be found at page 7, lines 19, 20, and 25 where the front end processor 108 is discussed.

In Fig. 2D, frequency reference points are updated to include the 0 Hz reference point and adding MHz units to the 5 MHz, 7 MHz, and the 42 MHz reference points to be consistent with Fig. 2C, for example. The 7 MHz reference point is the point of interference noted in the specification discussion of Fig. 2D at page 8, lines 17-19.

In Fig. 3, the title of element 104 has been changed from "Receiver" to "Receiver System". Support for this change can be found at page 7, lines 15-19 where the receiver system 104 of Fig. 1 is discussed.

In Fig. 6, the input line labeled "102.4" has been changed to "102.4 mega samples per second" to correspond to the specification at page 11, lines 13-16. The subscript on the down-converter 606 is changed to N for the Nth channel represented in Fig. 6 and the output of decimator 612 is changed to CHN for the Nth channel. Support for these changes can be found at page 12, in lines 8-11 where it is indicated there are N channels within the upstream band and down-converters 602, 604, and 606 are dedicated to one of the N channels. Down converter 606

is the last down-converter in the series and consequently corresponds to CHN as also indicated by the CHN output of the decimator 612 connected to down-converter 606.

In Fig. 10, the input line 1002 is changed from "102.4 MHz Input From A/D" to "102.4 Mega Samples Per Second Input From A/D" to correspond to the description in the specification at page 16, lines 15 and 16 where the data input 1002 is discussed to be 102.4 mega-samples per second.

In Fig. 12, the I_n , Q_n , and $Data_n$ labels associated with data memory 1204 have been changed to correct the channel reference number for channel N, changing I_n , Q_n , and $Data_n$ to I_N , Q_N , and $Data_N$. These changes have been made to be consistent with the naming convention for channel N used in the specification and figures, such as Figs 5, 8, and 13, for example.

In Fig. 13, the reference number for the vectored data, associated with the time tracking unit (time recovery) 1224, has been changed from 1220 to 1226 to properly correspond to unit 1226 in Fig. 12 as the time state storage associated with the time tracking loop (time recovery) 1224. The element 1218 in Fig. 13 has been changed to 1218' to differentiate the different labels for the 1218 elements in Figs. 12 and 13. The reference number for the vectored data, associated with the phase tracking & symbol slicer 1218', has been changed from 1226 to 1220 to properly correspond to the unit 1220 in Fig. 12 as the phase state storage.

Remarks

The present amendment responds to the Official Action dated May 31, 2005. The Official Action objected to claims 1-36 due to informalities in claims 1, 8, 9, 11, 18, 26, 28, 29, and 36. The Official Action rejected claims 1, 5-8, 10, 17, 22-24, 28, and 36 under 35 U.S.C. § 112. Claims 1-36 were indicated to be allowable if rewritten or amended to overcome the rejections to claims 1, 5-8, 10, 17, 22-24, 28, and 36. The objections and the grounds of rejection are addressed below. Claims 1, 2, 5-11, 13-15, 17-19, 22-29, 32-34, and 36 have been amended to be more clear and distinct. Claims 1-36 are presently pending.

Amendments to the Specification

The section titled Related Applications has been moved from page 3 to page 2 before the Background of the Invention. The caption has also been changed to Cross-Reference to Related Applications. These changes have been made to conform the specification to the proper arrangement and titles of sections within the specification as stated in MPEP 608.01(a) Arrangement of Application.

U.S. Application Serial No. 09/695,647 for “APPARATUS AND METHOD FOR MULTI-CHANNEL COMMUNICATIONS SYSTEM”, and U.S. Application Serial No. 09/695,645 for “APPARATUS AND METHOD FOR MULTI-CHANNEL RECEIVER FRONT END” have been added, as the serial numbers were not available at the time of the original filing of the application.

The paragraph beginning on page 2, line 25 has been amended to correct the U.S. Patent number incorrectly listed as 5,41,468 to 5,841,468 to correctly refer to the U.S. Patent titled "SYSTEM AND METHOD FOR ROUTING DATA MESSAGES THROUGH A CABLE TRANSMISSION SYSTEM" issued to Wright. Also, the title of U.S. Patent 6,100,883 has been changed from HOME INTERFACE CONTROLLERFOR PROVIDING INTERACTIVE CABLE TELEVISION to HOME INTERFACE CONTROLLER FOR PROVIDING INTERACTIVE CABLE TELEVISION to correct a typo.

The paragraph beginning on page 6, line 6 has been amended to correct an incomplete sentence so as to properly reference the two main elements of Fig. 1. The sentence beginning on line 13 "In an illustrative embodiment, the system 100 a transmitter 102 and a receiver system 104." is amended to "In an illustrative embodiment, the system 100 includes a transmitter 102 and a receiver system 104."

The paragraph beginning on page 7, line 1 has been amended on line 6 to spell out the first use of the abbreviation DOCSIS in the Detailed Description section. For reasons of improved clarity, the phrase "non-overlapping channels of .2 MHz,.4 MHz,.8 MHz,1.6 MHz, or 3.2MHz" has been changed to "non-overlapping channels of .2 MHz,.4 MHz,.8 MHz,1.6 MHz, or 3.2MHz" to add spacing between the channel frequency numbers. A typo on line 18 has been amended by adding a period at the end of the sentence beginning on line 14 "In DOCSIS..." and ending on line 18 "...of Figure 2E." This same sentence beginning on line 14 has also been amended to change "as illustrated in the frequency diagram of Figure 2E." to "is illustrated in the frequency diagram of Figure 2E." to correct a typo. In this paragraph, an incorrect figure

reference has also been corrected. At page 7, line 20, "Figure 2" has been amended to "Figure 3" to correctly reference the block diagram that includes cables 300, subscribers 302, and headend 304. Also, in this paragraph, the name of the element labeled 104 has been amended to correctly refer to element 104 as the receiver system as introduced in the first paragraph of the Detailed Description section beginning on page 6, lines 10-11.

The paragraph beginning on page 7, line 24 has been amended to correct a reference to the system illustrated in Fig. 3. The communications system 100 of Fig. 1 illustrates a system having a single transmitter 102. In the paragraph beginning on page 7, line 24 reference to system 100 has been amended to reference system 310 consistent with the discussion in the same sentence which addresses a system having multiple transmitters. The system 310 reference is also added to page 7, line 28.

The paragraph beginning on page 8, line 13 has been amended to change cable 408 to cables 408 to properly reference the multiple cables 408 that are shown in Fig. 4. Also, optical fiber 410 has been amended to optical fibers 410 to properly reference the multiple optical fibers 410 that are shown in Fig. 4.

The paragraph beginning on page 9, line 1 has been amended to correct an incorrect element reference in Fig. 4. The reference to mini-headend 302 has been amended to mini-headend 400, 402, 404 using the reference numbers 400, 402, 404 for the mini-headends introduced in the preceding paragraph beginning on page 8, line 13.

The paragraph beginning on page 9, line 20 has been amended to correct the abbreviated channel name for channel CHn to CHN to be consistent with the channel output names CH1, CH2, and CHN of baseband element 500 in Fig. 5.

The paragraph beginning on page 10, line 8 has been amended to correct the name of element 600 in Fig. 6 from a front end 600 to a front end processor 600. Support for this change can be found in the brief description of the drawings for Fig. 6 which states that "Figure 6 is a conceptual block diagram of one embodiment of a front end processor in accordance with the present invention". Further support for this change can be found in the second sentence of this paragraph that begins "The front end processor 600..." and correctly identifies element 600 as a front end processor. Also, the paragraph has been amended to clarify the usage of 102.4 in line 18 to be 102.4 mega-samples per second. Support for this change can be found in the first sentence of this paragraph on page 10, beginning on line 9 where the sample rate of 102.4 mega-samples per second was introduced.

The paragraph beginning on page 10, line 24 has been amended to change the reference name for element 600 from a front end 600 to a front end processor 600 in the first three sentences of this paragraph. The mathematical term on page 11, line 5 $e^{j\omega_N n}$ is changed to $e^{j\omega_N n}$ to correct a typo consistent with the usage of the mathematical term in the same sentence defining ω_N , "where ω_N is the center frequency". This same sentence is further amended to remove a period in line 6 changing "particular channel., to effect" to "particular channel, to effect" to correct a typo.

The paragraph beginning on page 12, line 3 has been amended to correct the abbreviated channel names "ch1, ch2, ch3; ch4; ch5, ch6, and chn1, chn2, chn3, and chn4" to "CH1, CH2, CH3; CH4; CH5, CH6, and CHN1, CHN2, CHN3, and CHN4" to be consistent with the channel names used in Fig. 8.

The paragraph beginning on page 12, line 12 has been amended to remove a typographical error. The letter "a" is removed from line 14, changing "yielding a I/Q data streams representing the component channels" to "yielding I/Q data streams representing the component channels".

The paragraph beginning on page 13, line 10 has been amended at lines 12 and 13 to change "the front end described in the discussion related to Figure 6" to "the front end processor described in the discussion related to Figure 6" to correctly reference the front end processor in Fig. 6 that is discussed on page 10, lines 11-14. A typographical error is corrected on page 13, line 15 changing "Such as system" to "Such a system". The reference numbers to the down-converters in Fig. 7 have been amended in line 24 changing "converters 728 through 726" to "converters 702 through 726". Support for this change can be found in the preceding paragraph beginning on page 13, line 1 where the down-converters in Fig. 7 were introduced.

The paragraph beginning on page 13, line 28 has been amended to correct the usage of "downconverter" on page 14, lines 11, 13, 14 and 15 and "down converter" in lines 12 to "down-converter" to be consistent with other usage of the term down-converter in this paragraph, such as that used at line 2 which recites "down-converters (704, 706, 708)". For similar reasons of consistency, the term "downconversion" used in line 14 is amended to "down-conversion". In

line 17, the "decimation filters 702 through 726 and the down-converters 728 through 752" are labeled incorrectly and have been amended to "decimation filters 728 through 752 and the down-converters 702 through 726" to be consistent with the naming of these elements as used in the specification. For example, the paragraph beginning on page 13, line 1 identifies the "down conversion stages 702 through 726" and the "decimation stages 728 through 752."

The paragraph beginning on page 18, line 5 has been amended in line 10 to change "A clock 1206" to "A clock 1203" to be consistent with the numbering of the clock, abbreviated as CLK 1203, used in Fig. 12.

The paragraph beginning on page 18, line 20 has been amended to clarify the description of the elements 1218, 1220, 1224, and 1226 used in Fig. 12. The short operational titles used for elements 1218, 1220, 1224, and 1226 in Fig. 12 are included in parenthesis in the description of the elements. The "phase tracking loop 1218" is changed to "phase tracking loop (phase recovery) 1218" and the "phase tracking storage 1220" is changed to "phase tracking storage (phase state) 1220". Also, the "time tracking loop 1224" is changed to "time tracking loop (time recovery) 1224" and the "time tracking storage 1226" is changed to "time tracking storage (time state) 1226".

The paragraph beginning on page 19, line 1 has been amended to correct the channel reference number for channel N, changing I_n and Q_n to I_N and Q_N and changing in line 7 the phrase "data from the nth channel written into the nth data memory segment" to the phrase "data from the Nth channel written into the Nth data memory segment". These changes have been made for consistency in the naming convention for channel N used in the specification and

figures, such as Figs 5, 8, and 13, for example. Also, a typo at line 12 is corrected by changing the phrase "is least twice" to the phrase "is at least twice".

The paragraph beginning on page 20, line 11 has been amended to correct the name of element 1206 in Fig. 12 in lines 12 and 14 from "equalizer 1206" to "equalizer subsystem 1206". Support for this change can be found in the paragraph beginning on page 18, line 5 where the "equalizer subsystem 1206" is introduced at line 13. The short operational titles used for elements 1218 and 1224 in Fig. 12 are included in parenthesis. The "phase tracking loop 1218" is changed to "phase tracking loop (phase recover) 1218" and the "time tracking loop 1224" is changed to "time tracking loop (time recovery)".

The paragraph beginning on page 20, line 24 has been amended to correct the reference of channel n to channel N as used in Fig. 13 in data memory 1204 and generally in the specification for the Nth channel. In line 25, "channels 1 through "n" respectively" has been amended to "channels 1 through "N" respectively". On page 21, lines 3 and 5 of this paragraph, "three and n" has been amended to "three and N". Support for this change can be found in the paragraph beginning on page 19, line 24 where on page 20 channel N is discussed at lines 4-7.

The paragraph beginning on page 21, line 10 has been amended to correct a typographical error. A period in line 14 has been removed from the middle of a sentence.

The paragraph beginning on page 21, line 24 has been amended to change the reference to CH4 to CHN as illustrated in Fig. 13 in the context of the discussion on channels 1, 2, 3, and N. For example, in this paragraph beginning at line 27, the thirty-two locations of data memory 1204 in Fig. 13 are described where "the first sixteen of which are allocated to channel CH1, the

next eight of which are allocated to channel CH2, the next four allocated to channel CH3, and the last four allocated to channel CHN."

The paragraph beginning on page 22, line 4 has been amended to correct an incorrect channel name and incorrect reference numbers. In line 5, CH4 has been changed to CHN to properly reference the use of CHN in Fig. 13. The references to elements 1220, and 1226 have been corrected in the description to be consistent with the elements labeled 1220, and 1226 in Fig. 12 and Fig. 13. The element 1218 in Fig. 13 has been changed to 1218' to resolve the different labels for the 1218 elements in Figs. 12 and 13. In lines 7 and 8, "the phase tracking loop 1226 of" has been changed to "the phase tracking loop 1218' of". In line 12, "the time tracking loop vector 1220" has been changed to "the time tracking loop vector 1226". In line 15, "the phase tracking loop vector 1226" has been changed to "the phase tracking loop vector 1220" and in line 20, "phase tracking loop state vector 1226" has been changed to "phase tracking loop state vector 1220".

The paragraph beginning on page 22, line 23 has been amended to correct two incorrect reference numbers and a typo. The "equalizer 1204" at line 27 has been amended to "equalizer 1208" to properly reference the equalizer 1208 in Fig. 12. The "state vector 1226" has been amended to "state vector 1220" to properly reference the updated phase tracking loop state vector that is stored in the phase tracking storage (phase state) 1220.

The paragraph beginning on page 23, line 9 has been amended to correct a typographical error. The duplicate words "decision value" from line 20 are deleted. In line 25, the phrase "A symbol slicer within the phase tracking circuit determines" has been replaced with "A symbol

slicer within the phase tracking circuit 1218' determines" to clarify the identity of the element 1218' in the discussion relating to Fig. 13.

Informality Objections to Claims 1-36

Claims 1, 2, 5-9, 11, 13-15, 17-19, 22-29, 32-34, and 36 have been amended to be more clear and distinct. More particularly, claims 1, 2, 8, 9, 11, 18, 19, and 26-29 have been amended to address the informality objections as discussed below.

Claims 1, 2, 18, and 19 have been amended to replace the word "constituent" in lines 7, 9, and 11 of claim 1, line 2 of claim 2, lines 7, 8, and 10 of claim 18, and line 2 of claim 19 with "two or more non-overlapping" so as to be consistent with the antecedent in lines 2-3 of claims 1 and 18.

Claim 1 is amended to replace the phrase "the cycling data" with "the cycling of data" in line 12.

Claim 8, line 3, the second occurrence of "data stream" is deleted.

Claim 9 and 27 have been amended to replace the word "channels" in line 2 of claim 9 and line 4 of claim 27 with "channel signals" so as to be consistent with the antecedent in claims 8, line 5 and 26, line 4, respectively.

Claim 28 has been amended to change the dependency from claim 26 to claim 27 to provide the antecedent basis for the limitation "downconverters".

Claims 11 and 29 have been amended to spell out DOCSIS as "data over cable service interface specification".

Claim 28 has been amended to change "a decimator" to "a plurality of decimators with a decimator" to correspond to the plurality of downconverters of claim 27 and provide the antecedent basis for the decimators of claim 36.

Typos in Claims

In the process of preparing this response, a number of typos in the claims were noted and corrected as addressed below.

In claim 25, the word "steps" was replaced with "step" to correspond to the single presented step (G). Also, in claim 25, the phrase "two or more non-overlapping" is replaced with the phrase "two or more non-overlapping channels" to add the missing word "channels". Support for this change can be found in lines 2 and 3 of claim 18 that claim 25 depends from.

In claim 36, the word "step" was replaced with "steps" to correspond to the presented steps (H), (I), and (J).

In claim 36, a comma was inadvertently placed at the end of step (H) and is replaced with a semi-colon.

The 35 U.S.C. § 112 Rejections

Claims 1 and 18 have been amended to replace the phrase "the components" with the phrase "the equalizer, the timing recovery, and phase recovery circuits" to address the lack of antecedent basis rejection.

Claim 8, 9, 26, and 27 have been amended to replace the word "component" in line 5 of claim 8, line 2 of claim 9, line 4 of claim 26, and line 3 of claim 27 with "two or more non-overlapping" to address the lack of antecedent basis rejection concerning claim 8 and to be consistent with the antecedent in lines 2-3 of claims 1 and 18.

Claims 5 and 22 have been amended to replace the phrase "the ratio" with the phrase "a ratio" as the "ratio" is described in claims 5 and 22 for the first time.

Claim 2 and 19 have been amended by replacing the phrase "to store data for" to the phrase "to store data in data memory locations for" to address the lack of antecedent basis rejection for "the data memory locations" of claim 6 and claim 23, respectively.

Claim 6 has been amended by changing the dependency from claim 1 to claim 2 to address the lack of antecedent basis rejection for "the data memory locations". Claim 6 has been further amended by replacing the phrase "related to data" to the phrase "related to the data" to refer to the data stored in the data memory locations of claim 2.

Claim 23 has been amended by changing the dependency from claim 18 to claim 19 to address the lack of antecedent basis for "the data memory locations".

As addressed in further detail below, claims 1, 7-9, 13-15, 17, 18, 24-27, 32-34, and 36 have been amended to address the use of the word "band" and phrases "the entire band", "the multi-channel band" and "the frequency band" for proper antecedent referencing.

Claims 1 and 18 have been amended to replace the word "band" with the phrase "communications band" in the following lines:

in line 2, "in a band of" is replaced with "in a communications band of",
in line 4, "the entire band," is replaced with "the communications band,",
in line 5, "within the band" is replaced with "within the communications band", and
in lines 15 and 16, "the multi-channel band" is replaced with "the communications band".

Claim 7 and 24 have been amended to replace the phrase "the entire communications band" with the phrase "the communications band" to address the lack of antecedent basis rejection.

Claim 8 has been amended by replacing the word "band" with the phrase "communications band" in the following lines:

in line 4, "the entire band" is changed to "the communications band" and
in lines 5 and 6, "the band" is changed to "the communications band".

Claim 9, 27, and 36 have been amended by replacing "the band" with "the communications band".

Claims 13, 14, and 15 have been amended by replacing "the frequency band" with "the communications band".

Claim 17 has been amended by replacing the word "band" with the phrase "communications band" in the following lines:

in line 2, "the entire band" is replaced with "the communications band" and
in line 3, "the band" is replaced with "the communications band".

Claim 25 has been amended by replacing the phrase "a band" with "the communications band".

Claim 26 has been amended by replacing the word "band" with the phrase "communications band" in the following lines:

in line 2, "the entire band" is replaced with "the communications band" and
in lines 3 and 4, "the band" is replaced with "the communications band".

Claims 32, 33, and 34 have been amended by replacing "the frequency band" with "the communications band".

Claims 9 and 27 have been amended to replace the phrase "convert to baseband" with "convert to baseband channels signals" to address the lack of antecedent basis rejection of claims 10 and 28.

Claim 10 has been amended to replace the phrase "decimate the corresponding baseband" with the phrase "decimate a corresponding baseband" as part of resolving the antecedent basis rejection of claim 10.

Claim 28 has been amended to replace the phrase "baseband channel signal" with the phrase "baseband channel signals" and to replace the phrase "decimate the corresponding

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baseband" with the phrase "decimate a corresponding baseband" as part of resolving the antecedent basis rejection of claim 28.

Claims 17 and 36 have been amended to replace the phrase "full-band analog signal" with the phrase "data stream" to resolve the lack of antecedent basis rejection.

Claims 1, 2, 5-11, 13-15, 17-19, 22-29, 32-34, and 36 have been amended to overcome the rejections under 35 U.S.C. § 112 placing claims 1-36 in order for allowance.

Conclusion

Withdrawal of the present rejection and prompt allowance are requested.

Respectfully submitted,



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